

Chapter 3.4 INDIVIDUAL RIVER BASIN ASSESSMENT SUMMARY

Potomac and Shenandoah River Basin

The Potomac-Shenandoah River Basin, as its name implies, is made up of the Shenandoah River Subbasin and the Potomac River Subbasin. It occupies the northern portion of Virginia and covers 5,747 square miles or 14 percent of the Commonwealth's total area.

In Virginia, the Potomac-Shenandoah basin is defined by both hydrologic and political boundaries. The basin is bounded by the James River, Rappahannock River, and York River Basins to the west and south. The northern and eastern perimeter of the basin is bounded by the West Virginia and Maryland state lines and the District of Columbia.

The headwaters of the Shenandoah River Subbasin begin in Augusta County and flow in a northeasterly direction for approximately 100 miles to the West Virginia State line. The basin averages 30 miles in width and covers 2,926 square miles.

The topography of the Shenandoah River Subbasin is characterized by rolling hills and valleys bordered by the Appalachian Mountains to the west and the Blue Ridge Mountains to the east. The Massanutten Mountain Range divides the Shenandoah River into the North and South Forks. Tributaries of the Shenandoah River exhibit steep profiles as they drain the surrounding mountain ridge. The main stems of the Shenandoah exhibit a moderately sloping profile with occasional riffles and pools. Forty-five percent of the land is forested due to the large amount of federally owned land and the steep topography. Farmland and pasture account for 39 percent of the land area, while 16 percent is urban.

The Virginia headwaters (South Branch) of the Potomac River Subbasin begin in Highland County. The headwaters drainage area is 323 square miles. The river then flows in a northeasterly direction through West Virginia and into Maryland before being joined by the Shenandoah at Harper's Ferry, West Virginia. The Potomac continues flowing in a southeasterly direction as the border between Maryland and Virginia, to the northern locations in Loudoun and Fauquier Counties, to less than one mile in Westmoreland County. Approximately 2,821 of the 14,700 total square miles of the Potomac River Subbasin lie in Virginia. The remainder encompasses portions of four other states and the District of Columbia.

From Harpers Ferry to about 45 miles down river, the topography of the upper Piedmont region of the Potomac River Subbasin is characterized by gently sloping hills and valleys. In the central Piedmont area, its profile is rather flat until it nears the fall line at Great Falls, where the stream elevation rapidly descends from over 200 feet, to sea level. Tributaries to the Potomac in the central Piedmont region exhibit moderate and near constant profiles. In the Coastal Plain area, streams are characterized primarily by their flat slope. Approximately 40 percent of the Potomac River Basin is forested, 33 percent is farmland and pasture and an estimated 27 percent is urban.

The 1994 population of the Potomac-Shenandoah River Basin was approximately 1,973,736. The majority of the population resides in urban northern Virginia across the river from Washington, D.C. All or part of the following jurisdictions lie within the basin: counties – Arlington, Augusta, Clarke, Fairfax, Fauquier, Frederick, Highland, King George, Loudoun, Northumberland, Page, Prince William, Rockingham, Shenandoah, Stafford, Warren, and Westmoreland; cities – Alexandria, Fairfax, Falls Church, Manassas, Manassas Park, Harrisonburg, Staunton, Waynesboro, and Winchester.

Citizen-Generated Water Quality Monitoring Data in the Potomac-Shenandoah River Basin

The Potomac-Shenandoah River Basin has a number of active citizen monitoring organizations collecting and analyzing both ambient and benthic macroinvertebrate data. The citizen-generated data described in the following paragraphs are included in Appendix B of this report and in the supporting use analysis below.

The Alliance for the Chesapeake Bay (ACB) monitors a conventional suite of ambient parameters including dissolved oxygen, temperature, pH, salinity and water clarity in the Potomac River Subbasin. ACB also monitors selected sites for another suite of parameters (nutrients, water clarity, total suspended solids and chlorophyll a) related to submerged aquatic vegetation (SAV). Trained ACB volunteers monitored 13 stations and conducted 1,511 sampling events in the Potomac River Subbasin during the five-year data window for this report. These stations can be identified in Appendix B by “ALL” at the end of the station number.

The Audubon Naturalist Society (ANS) monitors benthic macroinvertebrates in the Potomac River Subbasin using the ANS protocol. Trained ANS volunteers monitored 21 stations in the Potomac Subbasin and conducted 134 sampling events for benthic macroinvertebrates during the data window for this report. These stations can be identified in Appendix B by “ANS” at the end of the station number.

The Izaak Walton League of America Virginia Save Our Streams Program (IWLA VA SOS) coordinates with a number of affiliate organizations in the Potomac-Shenandoah River Basin to monitor benthic macroinvertebrates. Affiliate organizations in this basin include Friends of the North River, Friends of the North Fork of the Shenandoah River, Friends of Page Valley, Middle River Monitors, and the Northern Virginia Water Quality Monitoring Program (coordinated by the Northern Virginia Soil and Water Conservation District). Certified IWLA VA SOS volunteers sampled 109 stations for benthic macroinvertebrates (65 in the Potomac River Subbasin and 44 in the Shenandoah River Subbasin) during 381 sampling events. These stations can be identified in Appendix B by “SOS” at the end of the station number.

The Loudoun Wildlife Conservancy (LWC) monitors benthic macroinvertebrates in the Loudoun County portion of the Potomac River Subbasin using the Audubon Naturalist Society protocol. Trained LWC volunteers monitored benthic macro-invertebrates at 13 stations in the Potomac Subbasin during 107 sampling events. These stations can be identified in Appendix B by “LWC” at the end of the station number.

The Potomac-Shenandoah River Basin is divided into eight USGS hydrologic units: HUC 02070001- South Branch Potomac; HUC 02070004-Conococheague-Opequon; HUC 02070005- South Fork Shenandoah; HUC 02070006- North Fork Shenandoah; HUC 02070007- Shenandoah; HUC 02070008 Middle Potomac-Catoctin; HUC 02070010 Middle Potomac-Anacostia-Occoquon; HUC 02070011- Lower Potomac. The eight hydrologic units are further divided into 92 waterbodies or watersheds.

Assessment information for the Potomac-Shenandoah River Basin is summarized in Tables 3.4-1-1, 3.4-1-2, and 3.4-1-3.

Table 3.4-1-1 POTOMAC-SHENANDOAH RIVER BASIN INDIVIDUAL USE SUPPORT SUMMARY TABLE

Total Size Monitored:

Rivers - 1,957.00 miles

Lakes - 3,245.00 acres

Estuaries - 46.14 sq.miles

Basin Size Assessed:

Rivers - 5,865 miles

Lakes - 3,968 acres

Estuaries - 64 sq.miles

Use	Water Body Type	Size Fully Supporting	Size Fully Supporting But Threatened	Size Partially Supporting	Size Not Supporting	Total Size Assessed
Aquatic Life	River (mi)	936.08	547.05	398.83	109.59	1,991.55
	Lakes (acres)	221.00	158.00	91.00	1,854.00	2,324.00
	Estuary (sq. mi.)	16.42	22.67	2.35	4.20	45.64
Fish Consumption	River (mi)	5,639.79	43.24	130.63	51.10	5,864.76
	Lakes (acres)	3,968.25	0	0	0	3,968.25
	Estuary (sq. mi.)	42.70	0	21.15	0	63.85
Shellfish Consumption	River (mi)	-	-	-	-	0
	Lakes (acres)	-	-	-	-	0
	Estuary (sq. mi.)	26.23	0.28	7.50	0	34.02
Swimming	River (mi)	748.71	2.95	396.11	350.27	1,498.04
	Lakes (acres)	245.00	0	0	0	245.00
	Estuary (sq. mi.)	17.83	0	2.01	0	19.84
Public Water Supply	River (mi)	211.32	28.39	0	0	239.71
	Lakes (acres)	2,175.49	96.00	0	0	2,271.49
	Estuary (sq. mi.)	-	-	-	-	0

- not assessed

TABLE 3.4-1-2

**SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE
CATEGORIES IN POTOMAC-SHENANDOAH BASIN**

Cause of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
General Standards (Benthics)	River (mi)	317.66
	Lakes (acres)	0
	Estuary (sq. mi.)	0
PCB	River (mi)	61.12
	Lakes (acres)	0
	Estuary (sq. mi.)	20.85
Metals	River (mi)	143.56
	Lakes (acres)	0
	Estuary (sq. mi.)	0
pH	River (mi)	93.48
	Lakes (acres)	91.00
	Estuary (sq. mi.)	2.11
Ammonia	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1.95
Organic Enrichment/Low D.O.	River (mi)	11.66
	Lakes (acres)	1,854.00
	Estuary (sq. mi.)	2.49
Temperature	River (mi)	119.07
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Pathogen Indicators	River (mi)	746.38
	Lakes (acres)	0
	Estuary (sq. mi.)	8.46
Fish Tissue Exceedence	River (mi)	181.73
	Lakes (acres)	0
	Estuary (sq. mi.)	21.15
Flow Alterations	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Other Inorganics	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Habitat Alterations	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Suspended Solids	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0

TABLE 3.4-1-3 SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE CATEGORIES IN THE POTOMAC-SHENANDOAH BASIN

Source of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
Industrial Point Sources	River (mi)	14.33
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Municipal Point Sources	River (mi)	18.42
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Agriculture	River (mi)	385.48
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Urban Runoff/Storm Sewers	River (mi)	95.05
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Natural Sources (Stratification & Wildlife)	River (mi)	531.53
	Lakes (acres)	1,854.00
	Estuary (sq. mi.)	2.25
Source Unknown	River (mi)	417.16
	Lakes (acres)	91.00
	Estuary (sq. mi.)	23.86
Atmospheric Deposition	River (mi)	43.41
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Other Sources	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Land Disposal	River (mi)	4.80
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Nonpoint Sources	River (mi)	9.55
	Lakes (acres)	0
	Estuary (sq. mi.)	0
VDH Fish Consumption Advisory	River (mi)	171.71
	Lakes (acres)	0
	Estuary (sq. mi.)	19.74
Consent Decree Attachment B	River (mi)	14.51
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Collection System Failure	River (mi)	7.04
	Lakes (acres)	0
	Estuary (sq. mi.)	0
VDH Shellfish Condemnation	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	7.50

James River Basin

The James River Basin occupies the central portion of Virginia and covers 10,206 square miles or approximately 25 percent of the Commonwealth's total land area. It is Virginia's largest river basin and is made up of the Upper, Middle, and Lower James River Subbasins; and the Appomattox River Subbasin.

The James River Basin is defined by both hydrologic and political boundaries. The basin is bounded by the Potomac-Shenandoah River Basin, the Rappahannock River Basin and the York River Basins to the north. The southern boundary is made up of the New River Basin, the Roanoke River Basin and the Chowan River Basin. Its headwaters originate along the Virginia/West Virginia state line.

The James River Basin begins in the Alleghany Mountains and flows in a southeasterly direction to Hampton Roads where it enters the Chesapeake Bay. The James is formed by the confluence of the Jackson and Cowpasture Rivers and flows 228 miles to the Fall Line at Richmond and another 111 miles to the Chesapeake Bay.

The topography of the James River Basin varies throughout the four physiographic provinces that it spans. The Valley and Ridge Province extends from the Appalachian Plateau in West Virginia to the Blue Ridge Province. This province is dominated by narrow ridges and valleys running in a northeast/southwest direction, turning into a broad valley with low, rounded hills in the extreme southeast section of the province. The Blue Ridge Province, a remnant of a former highland, varies from the Valley and Ridge Province to the Fall Line. The western section of the Piedmont has scattered hills and small mountains, gradually turning into gently rolling slopes and lower elevation in the eastern Piedmont Province. The Coastal Plain Province is separated from the Piedmont by the Fall Zone. The Fall Zone is a three-mile stretch of river running through Richmond where the river descends 84 feet as it flows from the resistant rocks of the Piedmont to the softer sediments of the Coastal Plain.

Over 65 percent of the James River Basin is forested, with 19 percent in cropland and pasture. Approximately 12 percent is considered urban. The 1994 population for the James River Basin was approximately 1,909,511. This population is concentrated in two metropolitan areas: Tidewater, with over one million people, and the Greater Richmond – Petersburg area with over 750,000. Two smaller population centers are the Lynchburg and Charlottesville areas, each with over 100,000 people. All or portions of the following 39 counties and 14 cities lie within the basin: counties- Alleghany, Amherst, Bath, Nelson, Rockbridge, Augusta, Bedford, Botetourt, Campbell, Craig, Giles, Highland, Montgomery, Roanoke, Amelia, Buckingham, Chesterfield, Cumberland, Fluvanna, Goochland, Henrico, Powhatan, Albemarle, Appomattox, Prince Edward, Dinwiddie, Greene, Hanover, Louisa, Nottoway, Orange, Charles City, Isle of Wight, James City, New Kent, Prince George, Surry, and York; cities- Buena Vista, Clifton Forge, Charlottesville, Chesapeake, Colonial Heights, Covington, Hampton Lexington, Lynchburg, Petersburg, Portsmouth, Richmond, Hopewell, Norfolk, Newport News, Suffolk, Williamsburg and Virginia Beach.

Average annual precipitation is 42.5 inches. Average annual snowfall amounts range from over 30 inches in the mountains to less than 10 inches along the coast.

Major tributaries to the James River are Craig Creek, Maury River, Tye River, Rockfish River, Slate River, Rivanna River, Willis River, Appomattox River, Chickahominy River, Pagan River, Nansemond River, and the Elizabeth River.

Citizen-Generated Water Quality Monitoring Data in the James River Basin

The James River Basin has a number of active citizen monitoring organizations collecting and analyzing both ambient and benthic macroinvertebrate data. The citizen-generated data described in the following paragraphs are included in Appendix B of this report and the supporting use analysis in this section.

The Alliance for the Chesapeake Bay (ACB) monitors a conventional suite of ambient parameters including dissolved oxygen, temperature, pH, salinity and water clarity in the James River Basin. ACB also monitors selected sites for a suite of parameters (including nutrients, water clarity, total suspended solids and chlorophyll a) related to submerged aquatic vegetation (SAV). Trained ACB volunteers conducted 2,078 sampling events at 28 stations in the James River Basin during the 5-year data window for this report. These stations are designated in Appendix B by “ALL” at the end of the station number.

Clean Virginia Waterways (CVW) monitors a conventional suite of ambient parameters including dissolved oxygen, temperature, pH, water clarity, and fecal coliform in the Appomattox River Subbasin of the James River Basin. Trained CVW volunteers monitored 41 stations during 207 sampling events in this basin. These stations are designated in Appendix B by “CVW” at the end of the station number.

The Izaak Walton League of America Virginia Save Our Streams Program (IWLA VA SOS) coordinates with a number of affiliate organizations in the James River Basin to monitor benthic macroinvertebrates. Affiliate organizations in this basin include Buckingham Citizen Action League, Cowpasture River Preservation Association, Environmentally Concerned Citizens Organization, Environmental Education Center, Pedlar River Institute, Piedmont Environmental Council, Rivanna Conservation Society, Rivanna River Basin Project, and the Skyline Chapter of Trout Unlimited. Certified IWLA VA SOS volunteers sampled 85 stations in the James River Basin during 282 sampling events for benthic macroinvertebrates. These stations are designated in Appendix B by “SOS” at the end of the station number.

The Piedmont Region TMDL Initiative (a cooperative effort between the Piedmont, Peter Francisco and Monacan Soil and Water Conservation Districts) monitors for dissolved oxygen and fecal coliform in the Middle James Subbasin of the James River Basin. Monitors conducted 224 sampling events at 7 stations. These stations are designated in Appendix B by “PIE” at the end of the station number.

The James River Basin is divided into eight USGS hydrologic units as follows: HUC 02080201 – Upper James, HUC 02080202 – the Maury, HUC 02080203 – Upper Middle James, HUC 02080204 – the Rivanna, HUC 02080205 – the Lower Middle James, HUC 02080206 – Lower James, HUC 02080207 – the Appomattox, and HUC 02080208 – the Elizabeth. The eight hydrologic units are further divided into 109 waterbodies or watersheds.

Basin assessment information is presented in Tables 3.4-2-1, 3.4-2-2 and 3.4-2-3

TABLE 3.4-2-1

JAMES RIVER BASIN INDIVIDUAL USE SUPPORT SUMMARY TABLE

Total Size Monitored:

Rivers – 2,886.12 miles

Lakes - 9,786.96 acres

Estuaries – 243.89sq.miles

Basin Size Assessed:

Rivers - 12,922 miles

Lakes - 19,699 acres

Estuaries - 266 sq. miles

Use	Water Body Type	Size Fully Supporting	Size Fully Supporting But Threatened	Size Partially Supporting	Size Not Supporting	Total Size Assessed
Aquatic Life	River (mi)	2,128.95	1,892.88	168.94	185.21	4,375.98
	Lakes (acres)	383.91	9,537.93	2,004.95	5,850.00	17,776.79
	Estuary (sq. mi.)	5.47	32.21	176.95	51.32	265.95
Fish Consumption	River (mi)	11,894.41	1,020.93	6.54	0	12,921.88
	Lakes (acres)	19,589.19	110.00	0	0	19,689.19
	Estuary (sq. mi.)	5.40	239.28	21.27	0	265.95
Shellfish Consumption	River (mi)	-	-	-	-	0
	Lakes (acres)	-	-	-	-	0
	Estuary (sq. mi.)	94.99	0	17.62	0.50	113.11
Swimming	River (mi)	1,621.31	0	515.77	160.66	2,297.74
	Lakes (acres)	8,322.79	0	0	0	8,322.79
	Estuary (sq. mi.)	234.65	0	17.04	11.79	263.48
Public Water Supply	River (mi)	1,400.48	0	6.89	0	1,407.37
	Lakes (acres)	14,688.97	0	0	110	14,796.97
	Estuary (sq. mi.)	8.72	0	0	0	8.72

TABLE 3.4-2-2

**SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE
CATEGORIES IN JAMES BASIN**

Cause of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
General Standards (Benthics)	River (mi)	82.03
	Lakes (acres)	0
	Estuary (sq. mi.)	1.00
Non-Priority Organics	River (mi)	6.54
	Lakes (acres)	0
	Estuary (sq. mi.)	24.77
PCB	River (mi)	6.54
	Lakes (acres)	0
	Estuary (sq. mi.)	29.74
Metals	River (mi)	6.89
	Lakes (acres)	0
	Estuary (sq. mi.)	11.97
PH	River (mi)	119.14
	Lakes (acres)	1,700.00
	Estuary (sq. mi.)	1.43
Fish Tissue Exceedence	River (mi)	6.54
	Lakes (acres)	0
	Estuary (sq. mi.)	12.25
Organic Enrichment/Low D.O.	River (mi)	160.93
	Lakes (acres)	7,964.95
	Estuary (sq. mi.)	22.16
Temperature	River (mi)	55.18
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Pathogen Indicators	River (mi)	676.43
	Lakes (acres)	0
	Estuary (sq. mi.)	43.98
EPA OverListing (Nutrients)	River (mi)	0
	Lakes (acres)	1,500.00
	Estuary (sq. mi.)	225.48

**TABLE 3.4-2-3 SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE
CATEGORIES IN JAMES BASIN**

Source of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
Industrial Point Sources	River (mi)	42.31
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Municipal Point Sources	River (mi)	7.63
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Combined Sewer Overflow	River (mi)	37.55
	Lakes (acres)	0
	Estuary (sq. mi.)	10.84
Agriculture	River (mi)	140.46
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Stratification	River (mi)	0
	Lakes (acres)	7,004.95
	Estuary (sq. mi.)	0
Urban Runoff/Storm Sewers	River (mi)	103.25
	Lakes (acres)	0
	Estuary (sq. mi.)	12.37
Commercial Point Activity	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	11.97
Habitat Modification (Road Construction)	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0.75
Hydromodification	River (mi)	5.41
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Natural Sources	River (mi)	160.93
	Lakes (acres)	2,004.95
	Estuary (sq. mi.)	0
EPA Overlisting (Point/Nonpoint)	River (mi)	0
	Lakes (acres)	1,500.00
	Estuary (sq. mi.)	225.48
Consent Decree-Attachment B	River (mi)	6.57
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Source Unknown	River (mi)	453.70
	Lakes (acres)	2,550.00
	Estuary (sq. mi.)	52.91
Point/Nonpoint Sources	River (mi)	43.92
	Lakes (acres)	110.00
	Estuary (sq. mi.)	0
VDH Fish Consumption Advisory	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
VDH Shellfish Condemnation	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	17.62

Rappahannock River Basin

The Rappahannock River Basin is located in the northeastern portion of Virginia and covers 2,715 square miles or approximately 6.8 percent of the Commonwealth's total area.

The Rappahannock River Basin is bordered by the Potomac-Shenandoah Basin to the north and the York River Basin and Coastal Basin to the south. The headwaters lie in Fauquier, Madison and Rappahannock Counties and flow in a southeasterly direction to its mouth, where it enters the Chesapeake Bay between Lancaster and Middlesex Counties. The Rappahannock River Basin is 184 miles in length and varies in width from 20 to 50 miles. The Rappahannock River Basin's major tributaries are the Hazel River, Thornton River, Mountain Run, Rapidan River, Robinson River, Cat Point Creek, and the Corrotoman River.

The topography of the Rappahannock River Basin changes from steep to flat as it flows from the Blue Ridge Mountains to the Chesapeake Bay. About 51 percent of the basin land is forest, while pasture and cropland make up another 36 percent. Only about 6 percent of the land area is considered urban.

Most of the Rappahannock River Basin lies in the eastern Piedmont and Tidewater areas of the Commonwealth while its headwaters, located on the eastern slopes of the Blue Ridge, are considered to be in the northern and western Piedmont section.

The population of the Rappahannock River Basin was approximately 185,574 in 1994. The basin is mostly rural in character with no large population centers, however, the influence of metropolitan Washington is beginning to be felt in the Fredericksburg and Fauquier areas of the basin. All or portions of the following 18 counties lie within the Basin: Albemarle, Caroline, Culpeper, Essex, Fauquier, Gloucester, Greene, King and Queen, King George, Lancaster, Madison, Middlesex, Orange, Rappahannock, Richmond, Spotsylvania, Stafford, and Westmoreland.

Citizen-Generated Water Quality Monitoring Data in the Rappahannock River Basin

The Rappahannock River Basin has a number of active citizen monitoring organizations collecting and analyzing both ambient and benthic macroinvertebrate data. The citizen-generated data described in the following paragraphs are included in Appendix B of this report and the supporting use analysis in this section.

The Alliance for the Chesapeake Bay (ACB) monitors a conventional suite of ambient parameters including dissolved oxygen, temperature, pH, salinity and water clarity in the Rappahannock River Basin. Trained ACB volunteers conducted 1,906 sampling events at 18 stations in the Rappahannock River Basin during the 5-year data window for this report. These stations are designated in Appendix B by "ALL" at the end of the station number.

The Izaak Walton League of America Virginia Save Our Streams Program (IWLA VA SOS) coordinates with several affiliate organizations in the Rappahannock River Basin to monitor benthic macroinvertebrates. Affiliate organizations in this basin include the Friends of the Rappahannock and the Upper Rappahannock Watershed Stream Monitoring Program (a cooperative effort between the Culpeper and John Marshall Soil and Water Conservation Districts). Certified IWLA VA SOS volunteers sampled 54 stations in the Rappahannock River Basin during 94 sampling events for benthic macroinvertebrates. These stations are designated in Appendix B by "SOS" at the end of the station number.

The John Marshall Soil and Water Conservation District monitors a conventional suite of parameters including dissolved oxygen, temperature, pH, fecal coliform, nutrients, and solids in the Rappahannock River basin. Trained District volunteers conducted 39 sampling events at 4 stations during the data window for this report. These stations are designated in Appendix B by "JMS" at the end of the station number.

The Rappahannock River Basin is divided into two USGS hydrologic units as follows: HUC 02080103 – Rapidan – Upper Rappahannock; and HUC 02080104 – Lower Rappahannock. The two hydrologic units are further divided into 26 waterbodies or watersheds.

Basin assessment information is presented in Tables 3.4-3-1, 3.4-3-2, and 3.4-3-3.

TABLE 3.4-3-1 RAPPAHANNOCK RIVER BASIN INDIVIDUAL USE SUPPORT SUMMARY TABLE

Total Size Monitored:

Rivers – 353.29

Lakes – 235 acres

Estuaries – 156.41 sq. miles

Basin Size Assessed:

Rivers - 2,797 miles

Lakes - 488 acres

Estuaries - 168 sq. miles

Use	Water Body Type	Size Fully Supporting	Size Fully Supporting But Threatened	Size Partially Supporting	Size Not Supporting	Total Size Assessed
Aquatic Life	River (mi)	256.22	1,103.11	12.85	9.68	1,381.86
	Lakes (acres)	0	253.00	0	0	253.00
	Estuary (sq. mi.)	0	48.13	0.71	118.72	167.56
Fish Consumption	River (mi)	2,785.78	10.94	0	0	2,796.72
	Lakes (acres)	488.00	0	0	0	488.00
	Estuary (sq. mi.)	129.11	6.77	31.68	0	167.56
Shellfish Consumption	River (mi)	-	-	-	-	0
	Lakes (acres)	-	-	-	-	0
	Estuary (sq. mi.)	126.97	0.34	11.04	0	138.35
Swimming	River (mi)	95.10	3.72	92.96	38.87	230.65
	Lakes (acres)	0	0	0	0	0
	Estuary (sq. mi.)	133.09	0.21	7.39	0	136.19
Public Water Supply	River (mi)	16.26	0	0	0	16.26
	Lakes (acres)	0	253.00	0	0	253.00
	Estuary (sq. mi.)	-	-	-	-	0

TABLE 3.4-3-2

**SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE
CATEGORIES IN RAPPAHANNOCK BASIN**

Cause of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
General Standards (Benthics)	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Unknown Toxicity	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Priority Organics	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Metals	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
PH	River (mi)	17.56
	Lakes (acres)	0
	Estuary (sq. mi.)	0.71
Fish Tissue Exceedence	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	31.68
Organic Enrichment/Low D.O.	River (mi)	6.16
	Lakes (acres)	0
	Estuary (sq. mi.)	77.76
EPA Overlisting (Nutrients)	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	117.62
Pathogen Indicators	River (mi)	131.83
	Lakes (acres)	0
	Estuary (sq. mi.)	16.38
Habitat Alterations	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Suspended Solids	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0

TABLE 3.4-3-2

**SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE
CATEGORIES IN RAPPAHANNOCK BASIN**

Source of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
Industrial Point Sources	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Municipal Point Sources	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1.46
Combined Sewer Overflow	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Agriculture	River (mi)	17.01
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Stratification	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	4.36
Other	River (mi)	17.01
	Lakes (acres)	0
	Estuary (sq. mi.)	0
EPA Overlisting (Point/Nonpoint)	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	117.62
Urban Runoff/ Storm Sewers	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Land Disposal	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Natural Sources	River (mi)	12.44
	Lakes (acres)	0
	Estuary (sq. mi.)	27.19
Source Unknown	River (mi)	109.93
	Lakes (acres)	0
	Estuary (sq. mi.)	54.31
VDH Fish Consumption Advisory	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
VDH Shellfish Condemnation	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	9.70

Roanoke River Basin

The Roanoke River Basin covers 6,382 square miles or approximately 16 percent of the Commonwealth's total area. In addition to the Roanoke itself, the basin also contains the Ararat River Subbasin.

The Virginia portion of the Roanoke River Basin is defined by both hydrologic and political boundaries. The basin is bounded to the north by the James River Basin, on the east by the Chowan River Basin, and to the west by the New River Basin. The southern boundary of the basin is the Virginia/North Carolina State line.

The topography of the Roanoke River Basin ranges from steep slopes and valleys in the Valley and Ridge Province to gently sloping terrain east of the mountains in the Piedmont Province.

The Roanoke River Basin headwaters begin in the mountainous terrain of eastern Montgomery County and flow in a southeasterly direction to the Virginia/North Carolina state line. The Roanoke Basin passes through three physiographic provinces, the Valley and Ridge Province to the northwest, and the Blue Ridge and Piedmont Provinces to the southeast.

The Roanoke watershed is large enough to accommodate two major reservoirs, Smith Mountain and Leesville Lakes to the north and Kerr Reservoir and Lake Gaston located at the junction of the Roanoke River and the North Carolina state line. These reservoirs range in size from the 49,000 acre Kerr Reservoir to the 3,400 acre Leesville Lake. These impoundments are used for both recreation and hydroelectricity. Major tributaries in the northern section of the basin are the Little Otter and Big Otter Rivers along with the Blackwater and Pigg Rivers. Major tributaries in the southern portion include the Dan River, Smith River, and Banister River. Over 62 percent of the Roanoke River Basin is forested, while nearly 25 percent is in cropland and pasture. Approximately 10 percent is considered urban.

The 1994 population for the Roanoke River Basin was approximately 669,681. All or portions of the following sixteen counties and five cities and one town lie within the basin: counties – Patrick, Henry, Pittsylvania, Halifax, Franklin, Mecklenburg, Roanoke, Bedford, Campbell, Charlotte, Carroll, Brunswick, Montgomery, Botetourt, Floyd, and Appomattox; cities – Roanoke, Salem, Martinsville, Danville, Bedford, and the town of South Boston.

Citizen-Generated Water Quality Monitoring Data in the Roanoke River Basin

The Roanoke River Basin has several active citizen monitoring organizations collecting and analyzing both ambient and benthic macroinvertebrate data. The citizen-generated data described in the following paragraphs are included in Appendix B of this report and the supporting use analysis in this section.

The Izaak Walton League of America Virginia Save Our Streams Program (IWLA VA SOS) coordinates with several affiliate organizations in the Roanoke River Basin to monitor benthic macroinvertebrates. Affiliate organizations in this basin include Elliott Creek Watershed Protection Council and the Virginia Museum of Natural History at Virginia Tech. Certified IWLA VA SOS volunteers conducted 68 sampling events for benthic macroinvertebrates at 22 stations in the Roanoke River Basin during the 5-year data window for this report. These stations are designated in Appendix B by "SOS" at the end of the station number.

The Smith Mountain Lake Water Quality Monitoring Program is coordinated by Ferrum College and the Smith Mountain Lake Association. This program monitors (during the summer month only) secchi depth (water clarity) at "basic stations" while total phosphorus, nitrate, chlorophyll *a* and secchi depth data are collected at "advanced stations". Additionally, fecal coliform data is collected at 14 stations. Trained volunteers in this program have monitored a total of 120 stations during the data window for this report. These stations are designated in Appendix B by "FC" at the end of the station number.

The Roanoke River Basin is divided into six USGS hydrologic units as follows: HUC 03010101 – Upper Roanoke; HUC 03010102 – Middle Roanoke; HUC 03010103 – Upper Dan; HUC 03010104 – Lower Dan; HUC 03010105 – Banister, HUC 03010106 – Roanoke Rapids, and HUC 03040101 - Ararat. The hydrologic units are further divided into 85 watersheds.

Basin assessment information is presented in table 3.4-4-1, 3.4-4-2, and 3.4-4-3.

TABLE 3.4-4-1

ROANOKE RIVER BASIN INDIVIDUAL USE SUPPORT SUMMARY

Total Size Monitored:

Rivers – 1,468.97 miles

Lakes – 95,134.59 acres

Estuaries – 0 sq. miles

Basin Size Assessed:

Rivers - 9,451 miles

Lakes - 97,476 acres

Estuaries - 0 sq. miles

Use	Water Body Type	Size Fully Supporting	Size Fully Supporting But Threatened	Size Partially Supporting	Size Not Supporting	Total Size Assessed
Aquatic Life	River (mi)	1,182.53	722.42	139.02	23.89	2,067.86
	Lakes (acres)	49,552.59	92.00	0	45,520.00	95,164.59
	Estuary (sq. mi.)	-	-	-	-	0
Fish Consumption	River (mi)	9,167.45	108.46	175.52	0	9,451.43
	Lakes (acres)	22,701.00	154.00	74,621.00	0	97,476.00
	Estuary (sq. mi.)	-	-	-	-	0
Shellfish Consumption	River (mi)	-	-	-	-	0
	Lakes (acres)	-	-	-	-	0
	Estuary (sq. mi.)	-	-	-	-	0
Swimming	River (mi)	412.87	0	384.43	358.20	1,155.50
	Lakes (acres)	93,634.00	0	907.00	154.00	94,695.00
	Estuary (sq. mi.)	-	-	-	-	0
Public Water Supply	River (mi)	3,952.04	0	0	0	3,952.04
	Lakes (acres)	90,869.78	0	0	0	90,869.78
	Estuary (sq. mi.)	-	-	-	-	0

TABLE 3.4-4-2

**SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE
CATEGORIES IN ROANOKE BASIN**

Cause of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
General Standards (Benthics)	River (mi)	75.95
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Unknown Toxicity	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Non-Priority Organics	River (mi)	83.90
	Lakes (acres)	69,268.00
	Estuary (sq. mi.)	0
PCB	River (mi)	175.52
	Lakes (acres)	74,621.00
	Estuary (sq. mi.)	0
Metals	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
PH	River (mi)	0
	Lakes (acres)	8,935.00
	Estuary (sq. mi.)	0
Fish Tissue Exceedence	River (mi)	135.47
	Lakes (acres)	54,321.00
	Estuary (sq. mi.)	0
Organic Enrichment/Low D.O.	River (mi)	10.94
	Lakes (acres)	45,520.00
	Estuary (sq. mi.)	0
Temperature	River (mi)	76.02
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Pathogen Indicators	River (mi)	742.63
	Lakes (acres)	1,061.00
	Estuary (sq. mi.)	0
Habitat Alterations	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Suspended Solids	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0

TABLE 3.4-4-3

**SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE
CATEGORIES IN ROANOKE BASIN**

Source of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
Industrial Point Sources	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Municipal Point Sources	River (mi)	39.22
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Domestic Wastewater Lagoon	River (mi)	13.88
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Agriculture	River (mi)	377.83
	Lakes (acres)	683.00
	Estuary (sq. mi.)	0
Stratification	River (mi)	0
	Lakes (acres)	25,220.00
	Estuary (sq. mi.)	0
NonPoint Sources	River (mi)	38.01
	Lakes (acres)	2,325.68
	Estuary (sq. mi.)	0
Urban Runoff/ Storm Sewers	River (mi)	277.71
	Lakes (acres)	378.00
	Estuary (sq. mi.)	0
Hydromodification	River (mi)	10.94
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Natural Sources	River (mi)	280.52
	Lakes (acres)	25,374.00
	Estuary (sq. mi.)	0
Source Unknown	River (mi)	288.33
	Lakes (acres)	74,775.00
	Estuary (sq. mi.)	0
Habitat Modification	River (mi)	3.26
	Lakes (acres)	0
	Estuary (sq. mi.)	0
VDH Fish Consumption Advisory	River (mi)	125.77
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Contaminated Sediments	River (mi)	47.09
	Lakes (acres)	20,300
	Estuary (sq. mi.)	0

Chowan River-Dismal Swamp Basin

The Chowan River and Dismal Swamp Basin is located in the southeastern portion of Virginia and covers 4,061 square miles or approximately 10 percent of the Commonwealth's total area.

The Basin extends eastward from Charlotte County to the Chesapeake Bay. The Chowan River-Dismal Swamp Basin in Virginia is defined by both hydrologic and political boundaries. The basin is bordered by the James River Basin and the Small Coastal River Basins to the east, the Roanoke River Basin to the west and the Virginia/North Carolina State line to the south. The basin is approximately 145 miles in length and varies from 10 to 50 miles in width. The Chowan River-Dismal Swamp Basin flows through the Piedmont and Coastal Plain Physiographic Provinces. The Chowan portion flows 130 miles from west to east, crossing both the Piedmont and Coastal Plain, while the Dismal Swamp lies entirely within the Coastal Plain. The Piedmont portion is characterized by rolling hills, steeper slopes and somewhat more pronounced stream valleys. The Coastal Plain, in contrast, is nearly flat with a descending series of terraces.

The Chowan River-Dismal Swamp Basin is mostly rural with approximately 64 percent of its land covered by forest. Cropland and pasture make up another 28 percent, while only about 6 percent is classified as urban.

The 1994 population for the Chowan River-Dismal Swamp Basin was approximately 586,276. All or portions of the following 14 counties and four cities lie within the basin: counties – Greenville, Lunenburg, Southampton, Sussex, Brunswick, Charlotte, Dinwiddie, Isle of Wight, Mecklenburg, Nottoway, Prince Edward, Prince George and Surry; cities – Chesapeake, Emporia, Franklin, Petersburg, Suffolk, and Virginia Beach.

Major tributaries of the Chowan River are the Meherrin, the Nottoway and the Blackwater Rivers. The Nottoway and the Blackwater join at the Virginia/North Carolina state line to form the Chowan River. The Dismal Swamp portion is mostly flat with many swamp and marshland areas.

Citizen-Generated Water Quality Monitoring Data in the Chowan River Basin

The Chowan River Basin has one active citizen monitoring organization collecting and analyzing benthic macroinvertebrate data. The citizen-generated data described below are included in Appendix B of this report and the supporting use analysis in this section.

The Izaak Walton League of America Virginia Save Our Streams Program (IWLA VA SOS) coordinates with the J.R. Horsley Soil and Water Conservation District to monitor benthic macroinvertebrates in the Chowan River Basin. Certified IWLA VA SOS volunteers conducted 6 sampling events at 5 stations during the 5-year data window for this report. These stations are identified in Appendix B by an "SOS" designation at the end of the station number.

The Chowan River-Dismal Swamp Basin is divided into five USGS hydrologic units as follows: HUC 03010201 – Nottoway; HUC 03010202 – Blackwater; HUC 03010203 – Chowan; HUC 03010204 – Meherrin; and HUC 03010205 – Albemarle Sound. The five hydrologic units are further divided into 24 waterbodies or watersheds.

Basin assessment information is presented in Tables 3.4-5-1, 3.4-5-2, 3.4-5-3

TABLE 3.4-5-1

CHOWAN-DISMAL SWAMP BASIN INDIVIDUAL USE SUPPORT SUMMARY TABLE

Total Size Monitored:

Rivers - 756.33 miles

Lakes - 29.00 acres

Estuaries – 82.90 sq. miles

Basin Size Assessed:

Rivers - 4,994 miles

Lakes - 4,345 acres

Estuaries - 83 sq. miles

Use	Water Body Type	Size Fully Supporting	Size Fully Supporting But Threatened	Size Partially Supporting	Size Not Supporting	Total Size Assessed
Aquatic Life	River (mi)	1,155.37	229.94	189.69	560.06	2,135.06
	Lakes (acres)	3,513.00	0	0	29.00	3,542.00
	Estuary (sq. mi.)	0	82.70	0	0.20	82.90
Fish Consumption	River (mi)	4,961.80	26.14	5.72	0	4,993.66
	Lakes (acres)	4,345.00	0	0	0	4,345.00
	Estuary (sq. mi.)	82.90	0	0	0	82.90
Shellfish Consumption	River (mi)	-	-	-	-	0
	Lakes (acres)	-	-	-	-	0
	Estuary (sq. mi.)	-	-	-	-	0
Swimming	River (mi)	1,384.20	3.48	261.56	80.97	1,730.21
	Lakes (acres)	3,513.00	0	0	0	3,513.00
	Estuary (sq. mi.)	82.38	0	0.52	0	82.90
Public Water Supply	River (mi)	203.07	0	0	0	203.07
	Lakes (acres)	682.00	0	0	0	682.00
	Estuary (sq. mi.)	-	-	-	-	0

TABLE 3.4-5-2

**SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE
CATEGORIES IN CHOWAN-DISMAL SWAMP BASIN**

Cause of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
General Standards (Benthics)	River (mi)	7.66
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Known Toxicity (Ammonia)	River (mi)	1.46
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Pesticides	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Priority Organics	River (mi)	5.72
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Metals	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
PH	River (mi)	576.10
	Lakes (acres)	0
	Estuary (sq. mi.)	0
EPA Overlisting (DO&pH)	River (mi)	45.87
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Organic Enrichment/Low D.O.	River (mi)	715.01
	Lakes (acres)	29.00
	Estuary (sq. mi.)	0.20
Pathogen Indicators	River (mi)	342.53
	Lakes (acres)	0
	Estuary (sq. mi.)	0.52
Fish Tissue Exceedence	River (mi)	5.72
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Habitat Alterations	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Suspended Solids	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0

TABLE 3.4-5-3

**SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE
CATEGORIES IN CHOWAN-DISMAL SWAMP BASIN**

Source of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
Industrial Point Sources	River (mi)	13.37
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Municipal Point Sources	River (mi)	14.68
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Combined Sewer Overflow	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Agriculture	River (mi)	8.85
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Hydromodification	River (mi)	0
	Lakes (acres)	29.00
	Estuary (sq. mi.)	0
Silviculture	River (mi)	3.02
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Urban Runoff/ Storm Sewers	River (mi)	3.17
	Lakes (acres)	0
	Estuary (sq. mi.)	0
EPA Overlisting (Point/Nonpoint)	River (mi)	45.87
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Land Disposal (Septic tanks)	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0.52
Natural Sources	River (mi)	662.59
	Lakes (acres)	0
	Estuary (sq. mi.)	0.72
Source Unknown	River (mi)	353.84
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Other/ Water Quality Standards	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
VDH Shellfish Condemnation	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0

Tennessee-Big Sandy River Basin

The segment of the Tennessee and Big Sandy River Basin which lies in Virginia is made up of the Holston, Clinch-Powell, and Big Sandy River Subbasins. These subbasins are located in the extreme southwest portion of Virginia and cover 4,140 square miles or approximately 10.5 percent of the Commonwealth's total land area.

The Virginia portion of the Tennessee-Big Sandy River Basin is defined by both hydrologic and political boundaries. The West Virginia State line lies to the northeast, Kentucky to the west, and Tennessee to the south. The New River Basin makes up the eastern boundary.

While the Tennessee and Big Sandy Rivers are fed by numerous southwest Virginia streams, neither river forms within the Commonwealth itself. The Big Sandy subbasin contains the Levisa and Tug Forks which flow northward into Kentucky forming the Big Sandy River. The Tennessee River is formed in Tennessee by the southwestward flowing Holston, Clinch, and Powell tributaries. Both of the major river subbasins eventually empty into the Gulf of Mexico via the Ohio and Mississippi Rivers.

The Tennessee-Big Sandy River Basin spans three physiographic provinces: the Cumberland Plateau, Valley and Ridge, and the Blue Ridge. The Big Sandy portion of the basin lies within the Cumberland Plateau. This province is characterized as rugged, with mountainous terrain and steep valleys. Parallel valleys and ridges running in a northeast to southwest direction characterize the Tennessee portion lying in the Valley and Ridge Province. A small portion, located in the Blue Ridge Province, is more plateau-like, with no single, prominent ridge which characterizes the Ridge and Valley province to the north.

Within Virginia, approximately 48 percent of the Tennessee River Basin is forested, while cropland and pasture make up another 39.7 percent. The Big Sandy portion of the basin is approximately 86 percent forest, with only about 5 percent in cropland and pasture. Urban areas make up only a small percentage of the total land area.

The 1994 population for the Tennessee-Big Sandy River Basin was approximately 310,309 or 5 percent of Virginia's total population. All or part of the following political jurisdictions lie within the basin: Counties – Lee, Scott, Russell, Washington, Smyth, Tazewell, Buchanan, Dickinson, Bland, Wythe, Grayson, and Wise; Cities – Norton and Bristol.

Citizen-Generated Water Quality Monitoring Data in the Tennessee-Big Sandy River Basin

The Tennessee-Big Sandy River Basin has several active citizen monitoring organizations collecting and analyzing both ambient and benthic macroinvertebrate data. The citizen-generated data described in the following paragraphs are included in Appendix B of this report and the supporting use analysis in this section.

The Izaak Walton League of America Virginia Save Our Streams Program (IWLA VA SOS) coordinates with several affiliate organizations in the Tennessee-Big Sandy River Basin to monitor benthic macroinvertebrates. Affiliate organizations in this basin include the Buchanan Citizens Action Group and the Headwaters Association. Certified IWLA VA SOS volunteers conducted 22 sampling events at 16 stations in this river basin during the 5-year data window for this report. "SOS" at the end of the station number designates these stations in Appendix B.

The Upper Levisa River Restoration Project monitored fecal coliform in this river basin for a limited time period. Trained volunteers collected 120 samples for fecal coliform analysis at 15 stations in the Tennessee-Big Sandy River Basin. These stations are designated in Appendix B by "LRP" at the end of the station number.

The Tennessee-Big Sandy River Basin is divided into six USGS hydrologic units as follows: HUC 05070201 – Tug Fork; HUC 05070202 – Upper Levisa; HUC 06010101 – North Fork Holston; HUC 06010102 - South and Middle Fork Holston; HUC 06010205 – Upper Clinch; and HUC 01010206 – Powell River. The six hydrologic units are further divided into 48 waterbodies or watersheds.

Basin assessment information is presented in Tables 3.4-6-2, 3.4-6-2, and 3.4-6-3.

TABLE 3.4-6-1 TENNESSEE – BIG SANDY RIVER BASIN INDIVIDUAL USE SUPPORT SUMMARY

Total Size Monitored:

Rivers - 1,080.66 miles

Lakes - 3,797.00 acres

Estuaries - 0 sq. miles

Basin Size Assessed:

Rivers - 5,919 miles

Lakes - 3,844 acres

Estuaries - 0 sq. miles

Use	Water Body Type	Size Fully Supporting	Size Fully Supporting But Threatened	Size Partially Supporting	Size Not Supporting	Total Size Assessed
Aquatic Life	River (mi)	688.45	225.33	175.13	62.50	1,151.41
	Lakes (acres)	154.00	0	0	3,387.00	3,541.00
	Estuary (sq. mi.)	-	-	-	-	0
Fish Consumption	River (mi)	5,693.87	85.11	57.65	82.64	5,919.27
	Lakes (acres)	637.00	3,207.00	0	0	3,844.00
	Estuary (sq. mi.)	-	-	-	-	0
Shellfish Consumption	River (mi)	-	-	-	-	0
	Lakes (acres)	-	-	-	-	0
	Estuary (sq. mi.)	-	-	-	-	0
Swimming	River (mi)	304.87	0	92.29	131.93	529.09
	Lakes (acres)	2,144.00	0	0	0	2,144.00
	Estuary (sq. mi.)	-	-	-	-	0
Public Water Supply	River (mi)	318.26	0	0	0	318.26
	Lakes (acres)	3,243.00	0	0	0	3,243.00
	Estuary (sq. mi.)	-	-	-	-	0

TABLE 3.4-6-2

**SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE
CATEGORIES IN TENNESSE-BIG SANDY BASIN**

Cause of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
General Standards (Benthics)	River (mi)	168.07
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Unknown Toxicity	River (mi)	1.82
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Pesticides	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
PCB	River (mi)	57.65
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Metals	River (mi)	82.64
	Lakes (acres)	0
	Estuary (sq. mi.)	0
PH	River (mi)	0
	Lakes (acres)	314.00
	Estuary (sq. mi.)	0
Fish Tissue Exceedence	River (mi)	53.74
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Organic Enrichment/Low D.O.	River (mi)	0
	Lakes (acres)	3,387.00
	Estuary (sq. mi.)	0
Temperature	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Pathogen Indicators	River (mi)	164.77
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Habitat Alterations	River (mi)	16.24
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Suspended Solids	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0

TABLE 3.4-6-3

**SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE
CATEGORIES IN TENNESSEE-BIG SANDY BASIN**

Source of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
Industrial Point Sources	River (mi)	82.64
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Municipal Point Sources	River (mi)	10.12
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Hydromodification	River (mi)	1.11
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Agriculture	River (mi)	121.99
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Natural Sources	River (mi)	0
	Lakes (acres)	3,387.00
	Estuary (sq. mi.)	0
Urban Runoff/ Storm Sewers	River (mi)	82.76
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Resource Extraction	River (mi)	67.17
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Land Disposal	River (mi)	41.39
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Source Unknown	River (mi)	97.49
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Habitat Modification	River (mi)	17.40
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Point/Nonpoint Source	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
VDH Fish Consumption Advisory	River (mi)	94.64
	Lakes (acres)	0
	Estuary (sq. mi.)	0

Chesapeake Bay and Small Coastal Basins

The Chesapeake Bay/Small Coastal Basin is located in the eastern part of Virginia and covers 1,588 square miles or approximately 4 percent of the Commonwealth's total land area. The basin encompasses the small bays, river inlets, islands and shoreline immediately surrounding the Chesapeake Bay and the southern tip of the Delmarva Peninsula. This basin also includes the Chesapeake Bay itself.

The Chesapeake Bay/Coastal Basin is defined by both hydrologic and political boundaries. The basin is bordered by the Potomac River Basin, the Rappahannock River Basin, the York River Basin, the James River Basin and the Chowan River-Dismal Swamp Basin to its west. The Eastern Shore portion is bordered on the east by the Atlantic Ocean, on the north by Maryland, and on the west and south by the Chesapeake Bay.

The topography of the Chesapeake Bay/Coastal Basin varies little. The entire basin lies within the Coastal Plain Physiographic Province where elevations average no more than a few feet above sea level. More significant elevation occurs along the central spine of the Eastern Shore portion, which forms a plateau about 45 feet above sea level. Much of the Chesapeake Bay/Coastal Basin is marshland. About 30 percent of the Chesapeake Bay/Coastal Basin is forested, while nearly 21.6 percent is in cropland and pasture. Approximately 24 percent is considered urban.

The 1994 population for the Chesapeake Bay/Coastal Basin was approximately 385,716. All or portions of the following jurisdictions lie within the basin: counties – Accomack, Essex, Gloucester, King and Queen, Northampton, Lancaster, Matthews, Middlesex, Northumberland, Poquoson and York; cities – Norfolk, Virginia Beach, Hampton, and Newport News.

Tributaries in the Chesapeake Bay/Coastal Basin drain into the Chesapeake Bay or the Atlantic Ocean. Major tributaries flowing into the Chesapeake Bay are the Great Wicomico, Piankatank River/Dragon Swamp, Fleets Bay, Mobjack Bay- (East, North, Ware, and Severn Rivers), Poquoson, Back River and Lynnhaven which flow from the mainland. Tributaries in the Eastern Shore portion that drain into the Bay are Pocomoke, Ononcock, Pungateague, Occohannock, and Nassawadox. Machipongo River, Cat Point Creek, Assawoman Creek, Parker Creek, Folly Creek, and Finney Creek drain directly into the Atlantic Ocean.

Citizen-Generated Water Quality Monitoring Data in the Chesapeake Bay and Small Coastal River Basins

The Chesapeake Bay and Small Coastal River Basins has one active citizen monitoring organization whose data were directly used in this report. The citizen-generated data described below are included in Appendix B of this report and the supporting use analysis in this section.

The Alliance for the Chesapeake Bay (ACB) monitors a conventional suite of ambient parameters including dissolved oxygen, temperature, pH, salinity and water clarity in the Chesapeake Bay and Small Coastal River Basins. ACB also monitors selected sites for a suite of parameters (nutrients, water clarity, total suspended solids and chlorophyll *a*) related to submerged aquatic vegetation (SAV). Trained ACB volunteers conducted 3,123 sampling events at 43 stations in this basin during the five-year data window for this report. These stations are designated in Appendix B by "ALL" at the end of the station number.

The Chesapeake Bay/Coastal Basin is divided into seven USGS hydrologic units as follows: HUC 02060009 – Pocomoke River; HUC 02060010 – Chincoteague; HUC 02080101 – lower Chesapeake Bay; HUC 02080102 – Great Wicomico-Piankatank; HUC 02080108 – Lynnhaven-Poquoson; HUC 02080109 – Lower Western Delmarva; and HUC 02080110 – Eastern Lower Delmarva. The seven hydrologic units are further divided into 23 watersheds.

Basin assessment information is presented in Table 3.4-7-1, 3.4-7-2, and 3.4-7-3.

TABLE 3.4-7-1

CHESAPEAKE BAY SMALL COASTAL BASIN INDIVIDUAL USE SUPPORT SUMMARY TABLE

Total Size Monitored:

Rivers - 103.07 miles

Lakes - 515.00 acres

Estuaries - 1,533.18 sq. miles

Basin Size Assessed:

Rivers - 995 miles

Lakes - 2,511 acres

Estuaries - 1,789 sq. miles

Use	Water Body Type	Size Fully Supporting	Size Fully Supporting But Threatened	Size Partially Supporting	Size Not Supporting	Total Size Assessed
Aquatic Life	River (mi)	528.36	0	40.11	24.92	593.39
	Lakes (acres)	1,986.47	394.00	74.00	57.00	2,511.47
	Estuary (sq. mi.)	120.09	527.16	933.99	207.46	1,788.70
Fish Consumption	River (mi)	988.28	7.07	0	0	995.35
	Lakes (acres)	2,501.47	10.00	0	0	2,511.47
	Estuary (sq. mi.)	1,684.60	104.09	0.01	0	1,788.70
Shellfish Consumption	River (mi)	-	-	-	-	0
	Lakes (acres)	-	-	-	-	0
	Estuary (sq. mi.)	1,750.03	0.31	33.74	0	1,823.86
Swimming	River (mi)	548.27	0	30.31	3.10	581.68
	Lakes (acres)	2,511.47	0	0	0	2,511.47
	Estuary (sq. mi.)	254.92	0	0.53	0.43	255.88
Public Water Supply	River (mi)	28.00	0	0	0	28.00
	Lakes (acres)	1,568.80	0	0	0	1,568.80
	Estuary (sq. mi.)	0.01	0.01	0	0	0.01

TABLE 3.4-7-2

**SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE
CATEGORIES IN CHESAPEAKE BAY – SMALL COASTAL BASIN**

Cause of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
General Standards (Benthics)	River (mi)	16.32
	Lakes (acres)	0
	Estuary (sq. mi.)	380.00
Known Toxicity (Ammonia)	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Pesticides	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Priority Organics	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0.05
Metals	River (mi)	1.24
	Lakes (acres)	0
	Estuary (sq. mi.)	0
PH	River (mi)	21.61
	Lakes (acres)	57.00
	Estuary (sq. mi.)	0.40
Organic Enrichment/Low D.O.	River (mi)	37.14
	Lakes (acres)	74.00
	Estuary (sq. mi.)	761.74
Fish Tissue Exceedence	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0.01
Pathogen Indicators	River (mi)	33.41
	Lakes (acres)	0
	Estuary (sq. mi.)	33.79
EPA Overlisting (Nutrients)	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1,124.60
Suspended Solids	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0

TABLE 3.4-7-3

SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE CATEGORIES IN CHESAPEAKE BAY – SMALL COASTAL BASIN

Source of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
Industrial Point Sources	River (mi)	9.87
	Lakes (acres)	0
	Estuary (sq. mi.)	746.00
Municipal Point Sources	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	746.01
Combined Sewer Overflow	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
NonPoint Sources	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	746.00
Sources Outside of State	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	736.00
Urban Runoff/ Storm Sewers	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0.88
Leaking Storage Tanks	River (mi)	1.61
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Natural Sources	River (mi)	15.65
	Lakes (acres)	1.22
	Estuary (sq. mi.)	0
Source Unknown	River (mi)	64.19
	Lakes (acres)	74.00
	Estuary (sq. mi.)	7.44
Habitat Modification (Debris/Bottom Deposits)	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
EPA Overlisting (Point/Nonpoint)	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1,124.60
Stratification	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	597.88
VDH Shellfish Condemnation	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	32.30

York River Basin

The York River Basin lies in the central and eastern section of Virginia and covers 2,662 square miles or 7 percent of the Commonwealth's total area. It is defined by hydrologic boundaries, as the basin is bounded by the Rappahannock River Basin to the north and east and the James River Basin to the south and west.

The headwaters of the York River begin in Orange and Louisa counties and flow in a southeasterly direction for approximately 220 miles to its mouth at the Chesapeake Bay. The basin's width varies from five miles at the mouth to 40 miles at its headwaters.

The basin is comprised of the York River and its two major tributaries, the Pamunkey and the Mattaponi. The York River itself is only about 30 miles in length. The Pamunkey River's major tributaries are the North and South Anna Rivers and Little River, while the major Mattaponi tributaries are the Matta, Po and Ni Rivers.

Lying in the Piedmont and Coastal Plain physiographic provinces, the basin's topography is characterized by slightly rolling hills at the headwaters or extreme western portion, to gently sloping hills and flat farmland near its mouth. Tributaries in the central Piedmont exhibit moderate and near constant profiles. Streams in the Coastal Plain are largely characterized by their flat slope. Approximately 65 percent of the land area is forested. Farmland and pasture accounts for approximately 20 percent of the land area while approximately 10 percent of the river basin land area is urban.

The 1994 population for the York River Basin was approximately 250,332. The majority of the population is rural, evenly distributed throughout the basin. No major cities lie within the basin. All or portions of the following twelve counties lie within the basin: Albermarle, Caroline, Goochland, Hanover, Louisa, Orange, Spotsylvania, Gloucester, James City, King and Queen, King William, New Kent and York.

Citizen-Generated Water Quality Monitoring Data in the York River Basins

The York River Basin has several active citizen monitoring organizations collecting and analyzing both ambient and benthic macroinvertebrate data. The citizen-generated data described in the following paragraphs are included in Appendix B of this report and the supporting use analysis in this section.

The Alliance for the Chesapeake Bay (ACB) monitors a conventional suite of ambient parameters including dissolved oxygen, temperature, pH, salinity and water clarity in the York River Basin. ACB also monitors selected sites for a suite of parameters (including nutrients, water clarity, total suspended solids and chlorophyll a) related to submerged aquatic vegetation (SAV). Trained ACB volunteers conducted 2,169 sampling events at 28 stations in this basin during the five-year data window for this report. These stations are designated in Appendix B by "ALL" at the end of the station number.

The Izaak Walton League of America Virginia Save Our Streams Program (IWLA VA SOS) certified volunteers conducted 4 sampling events for benthic macroinvertebrates at 3 stations in the York River basin during the data window for this report. These stations are designated in Appendix B with an "SOS" at the end of the station number.

The Mattaponi and Pamunkey Rivers Association monitored water temperature, pH, total nitrogen, total phosphorus, and total suspended solids throughout the entire York watershed for a two-year study. Trained volunteers conducted 274 sampling events at 33 stations during the study. These stations are designated in Appendix B by "MPRA" at the end of the station number.

The York River Basin is divided into three USGS hydrologic units as follows: HUC 02080105 – Mattaponi River; HUC 02080106 Pamunkey River and HUC 02080107 York River. The three hydrologic units are further divided into 27 watersheds.

Basin assessment information is presented in Table 3.4-8-1, 3.4-8-2 and 3.4-8-3

TABLE 3.4-8-1

YORK RIVER BASIN INDIVIDUAL USE SUPPORT SUMMARY TABLE

Total Size Monitored:

Rivers - 483.21 miles

Lakes - 10,000 acres

Estuaries - 77.41 sq. miles

Basin Size Assessed:

Rivers - 3,361 miles

Lakes - 10,878 acres

Estuaries - 93 sq. miles

Use	Water Body Type	Size Fully Supporting	Size Fully Supporting But Threatened	Size Partially Supporting	Size Not Supporting	Total Size Assessed
Aquatic Life	River (mi)	285.73	342.96	50.31	64.11	743.11
	Lakes (acres)	3,077.00	1,442.60	0	0	4,519.60
	Estuary (sq. mi.)	0	11.75	52.98	18.52	83.25
Fish Consumption	River (mi)	3,356.02	0	4.72	0	3,360.74
	Lakes (acres)	7,717.60	0	3,160.00	0	10,877.60
	Estuary (sq. mi.)	86.34	6.27	0.26	0	92.87
Shellfish Consumption	River (mi)	-	-	-	-	0
	Lakes (acres)	-	-	-	-	0
	Estuary (sq. mi.)	50.24	0.11	11.67	0	91.72
Swimming	River (mi)	357.36	0	101.64	43.57	502.57
	Lakes (acres)	828.60	0	0	0	828.60
	Estuary (sq. mi.)	79.56	0	1.13	0	80.69
Public Water Supply	River (mi)	45.19	0	0	0	45.19
	Lakes (acres)	380.20	250.00	0	0	630.20
	Estuary (sq. mi.)	-	-	-	-	0

TABLE 3.4-8-2

**SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE
CATEGORIES IN YORK BASIN**

Cause of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
General Standards (Benthics)	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	1.50
Priority Organics	River (mi)	4.72
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Pesticides	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
PCBs	River (mi)	0
	Lakes (acres)	3,064.00
	Estuary (sq. mi.)	0.26
Metals	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
PH	River (mi)	67.91
	Lakes (acres)	0
	Estuary (sq. mi.)	1.96
Fish Tissue Exceedence	River (mi)	4.72
	Lakes (acres)	3,160.00
	Estuary (sq. mi.)	0
Organic Enrichment/Low D.O.	River (mi)	46.51
	Lakes (acres)	0
	Estuary (sq. mi.)	27.23
Thermal Modification	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Pathogen Indicators	River (mi)	145.21
	Lakes (acres)	0
	Estuary (sq. mi.)	12.51
Habitat Alterations	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
EPA Overlisting (Nutrients)	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	71.21

TABLE 3.4-8-3

**SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE
CATEGORIES IN YORK BASIN**

Source of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
Industrial Point Sources	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Municipal Point Sources	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Combined Sewer Overflow	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Agriculture	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Resource Extraction	River (mi)	5.49
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Urban Runoff/ Storm Sewers	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
EPA Overlisting (Point/Nonpoint)	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	71.21
Natural Sources	River (mi)	93.57
	Lakes (acres)	0
	Estuary (sq. mi.)	28.90
Source Unknown	River (mi)	153.55
	Lakes (acres)	3,160.00
	Estuary (sq. mi.)	28.83
Habitat Modification	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
VDH Fish Consumption Advisory	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
VDH Shellfish Condemnation	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	11.67

New River Basin

The New River Basin is located in southwest Virginia and covers 3,070 square miles or approximately 8 percent of the Commonwealth's total land area. The New River flows from its headwaters in Watauga County, North Carolina in a northeasterly direction to Radford, Virginia, and then in a northwesterly direction to Glen Lyn, where it exits into West Virginia. There it flows to the confluence of the Gauley River forming the Kanawha River, a tributary to the Ohio River.

The New River Basin in Virginia is defined by both hydrologic and political boundaries. It is bordered by the James River Basin and Roanoke River Basin to the east, and the Big Sandy River Basin and Tennessee River Basin to the west. The southern boundary of the Virginia portion is the North Carolina State line and its northwest boundary is the West Virginia State line.

The New River Basin runs 115 miles in length from Blowing Rock, North Carolina to Bluestone Dam near Hinton, West Virginia with a maximum width of 70 miles near Rural Retreat, Virginia. The Virginia portion of the New River Basin is 87 miles in length.

The topography of the New River Basin is generally rugged, with the upper reaches of it tributaries being extremely steep. High mountains, narrow valleys and steep ravines characterize the basin. There are ten tributaries in the Upper New River Basin that have more than 100 square miles of drainage area each and many others with forty or more square miles.

The New River Basin is the least densely populated of the Commonwealth's major river basins. The higher elevations of the basin have steep slopes and are thickly forested, while the mountain bases are mostly used for agriculture. Approximately 59 percent of its land is forested. Cropland and pasture make up another 35 percent, with approximately 3 percent considered urban.

The 1994 population for the New River Basin was approximately 211,673. All or portions of the following 11 counties lie within the basin: Grayson, Carroll, Smyth, Wythe, Pulaski, Floyd, Montgomery, Tazewell, Bland, Giles, and Craig and the cities of Galax and Radford.

Citizen-Generated Water Quality Monitoring Data in the New River Basin

The New River Basin has several active citizen monitoring organizations collecting and analyzing both ambient and benthic macroinvertebrate data. The citizen-generated data described in the following paragraphs are included in Appendix B of this report and the supporting use analysis in this section.

The Friends of Claytor Lake conducts a monitoring program in coordination with Ferrum College. This program monitors (during the summer month only) total phosphorus, nitrate, chlorophyll a and secchi depth. Additionally, fecal coliform data is collected at 7 stations. Trained volunteers in this program conducted a total of 708 sampling events at a total of 14 stations during the five-year data window for this report. These stations are designated in Appendix B by "FC" at the end of the station number.

The Izaak Walton League of America Virginia Save Our Streams Program (IWLA VA SOS) coordinates with several affiliate organizations in the New River Basin to monitor benthic macroinvertebrates. Affiliate organizations in this basin include Bluestone Watershed Committee, Virginia Museum of Natural History at Virginia Tech, Virginia Tech Student Chapter of the American Water Resources Association, Virginia Tech Wildlife Society, and Walker Creek Watershed Group. Certified IWLA VA SOS volunteers conducted 107 sampling events for benthic macroinvertebrates at 27 stations in the New River Basin during the data window for this report. "SOS" at the end of the station number designates these stations in Appendix B.

The New River Basin is divided into two USGS hydrologic units as follows: HUC 05050001 – Upper New; and HUC 05050002 – Middle New. The two hydrologic units are further divided into 37 waterbodies or watersheds.

Basin assessment information is presented in Table 3.4-9-1, 3.4-9-2 and 3.4-9-3.

TABLE 3.4-9-1

NEW RIVER BASIN INDIVIDUAL USE SUPPORT SUMMARY TABLE

Total Size Monitored:

Rivers - 716.57 miles
 Lakes - 4,875.83 acres
 Estuaries – 0 sq. miles

Basin Size Assessed:

Rivers - 4,111 miles
 Lakes - 5,252 acres
 Estuaries - 0 sq. miles

Use	Water Body Type	Size Fully Supporting	Size Fully Supporting But Threatened	Size Partially Supporting	Size Not Supporting	Total Size Assessed
Aquatic Life	River (mi)	773.11	292.87	56.65	20.39	1,143.02
	Lakes (acres)	335.00	475.95	0	4,211.88	5,022.83
	Estuary (sq. mi.)	-	-	-	-	0
Fish Consumption	River (mi)	4,037.62	3.71	69.75	0	4,111.08
	Lakes (acres)	789.38	4,139.65	323.24	0	5,252.27
	Estuary (sq. mi.)	-	-	-	-	0
Shellfish Consumption	River (mi)	-	-	-	-	0
	Lakes (acres)	-	-	-	-	0
	Estuary (sq. mi.)	-	-	-	-	0
Swimming	River (mi)	353.18	0	53.39	74.75	481.32
	Lakes (acres)	4,797.89	0	0	0	4,797.89
	Estuary (sq. mi.)	-	-	-	-	0
Public Water Supply	River (mi)	310.82	0	0	0	310.82
	Lakes (acres)	2,141.18	0	0	0	2,141.18
	Estuary (sq. mi.)	-	-	-	-	0

TABLE 3.4-9-2

**SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS CAUSE
CATEGORIES IN NEW BASIN**

Cause of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
General Standards (Benthics)	River (mi)	53.64
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Unknown Toxicity	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Pesticides	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
PCBs	River (mi)	69.75
	Lakes (acres)	323.24
	Estuary (sq. mi.)	0
Metals	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
PH	River (mi)	0
	Lakes (acres)	1,809.38
	Estuary (sq. mi.)	0
Siltation	River (mi)	8.45
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Organic Enrichment/Low D.O.	River (mi)	2.84
	Lakes (acres)	4,211.88
	Estuary (sq. mi.)	0
Temperature	River (mi)	12.11
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Pathogen Indicators	River (mi)	128.14
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Habitat Alterations	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Fish Tissue Exceedence	River (mi)	64.82
	Lakes (acres)	323.24
	Estuary (sq. mi.)	0

TABLE 3.4-9-3

SIZE OF WATERS NOT MEETING DESIGNATED USE BY VARIOUS SOURCE CATEGORIES IN NEW BASIN

Source of Not Meeting Designated Use	Type	Total Not Meeting Designated Use
Industrial Point Sources	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Municipal Point Sources	River (mi)	3.99
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Collection System Failure	River (mi)	2.84
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Agriculture	River (mi)	87.76
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Nonpoint Sources	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Urban Runoff/ Storm Sewers	River (mi)	55.86
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Resource Extraction	River (mi)	9.18
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Land Disposal	River (mi)	46.45
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Natural Sources	River (mi)	47.38
	Lakes (acres)	4,211.88
	Estuary (sq. mi.)	0
Source Unknown	River (mi)	16.76
	Lakes (acres)	323.24
	Estuary (sq. mi.)	0
Stratification	River (mi)	0
	Lakes (acres)	4,211.88
	Estuary (sq. mi.)	0
Habitat Modification	River (mi)	0
	Lakes (acres)	0
	Estuary (sq. mi.)	0
VDH Fish Consumption Advisory	River (mi)	65.29
	Lakes (acres)	0
	Estuary (sq. mi.)	0
Collection System Failure	River (mi)	2.84
	Lakes (acres)	0
	Estuary (sq. mi.)	0